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Generating value in program alliances: the value of dialogue in large-scale infrastructure projects

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ABSTRACT

Collaboration forms the backbone of program alliances, with the 'pain-gain share' regime acting as an incentive to engender behaviours that foster teamwork and trusting relationships to flourish. While dialogue within and between parties in a program alliance has been identified as key to establishing collaboration and trust, there is limited understanding of how it is engendered and maintained to ensure the delivery of superior project outcomes. In filling this void, our paper aims to address the following research question: *How does the value of dialogue influence effective collaboration in program alliances?* A sense-making lens is adopted to garner an understanding of the value of effective dialogue in two program alliance infrastructure projects. The value and power of dialogue are examined by addressing a recurring problem that negatively impacted the performance of the alliances and their projects: rework. We show that effective dialogue mitigated rework as participants had a shared purpose. Enacting dialogue helped shape the program alliances' culture and foster an environment where people felt safe to 'speak up'. This paper's contributions are 2-fold as we: (1) unearth new value-laden principles to support dialogue in program alliances; and (2) provide empirical evidence for practitioners to help them understand the value of dialogue in delivering a program of infrastructure projects using an alliance delivery strategy.

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Collaboration; dialogue; program alliance; sense-making; value; rework

1. Introduction

The future delivery of large-scale infrastructure projects will likely require more inter-team collaboration to cope with their complexity, especially on brownfield sites with unknown and uncertain latent conditions (Love, Ika, Matthews, Li, et al. 2021; Love, Ika, Matthews, et al. 2021; Love and Ika 2022). The advent of the fourth industrial revolution (Industry 4.00) requires organizations to openly engage and communicate with one another and share information (PwC 2016). Thus, within the context of large-scale infrastructure procurement, collaboration, and integration between organizations and the project teams become pivotal for their successful delivery, primarily when digital technologies, such as Building Information Modelling (BIM) are being used (Matthews et al. 2018).

Worldwide, government-initiated reports lamenting the traditional (design-bid-build, DBB) approach to delivering infrastructure projects abound (Emmerson 1962; Banwell 1967; Parker and Sieper 1991; Latham 1994; Kommerskollegium 1996; KTM 1996; Egan 1998; Construct 21 2000). In sum, they point out that the traditional approach is fragmented rather than integrated, opportunistic rather than principled, and characterized by high power and information asymmetry. However, over the past 20 years, a form of project delivery has emerged that integrates teams into a single entity, focussing on the best for project outcomes. This is known in the United States (US) as Integrated Project Delivery (Lichtig 2005) and in Australia, New Zealand, Finland, the United Kingdom (UK), and The Netherlands as Alliancing (Lahdenperä 2012; Walker and Rowlinson 2020). Common features of alliancing and IPD include the systemic integration of teams into a unified entity focussed and incentivized to collaborate with shared responsibility and accountability for the agreed project outcome (Walker and Rowlinson 2020).

All in all, alliancing is an intense form of IPD where collaboration and integration provide the ethos of working relationships in a project (Cohen 2010; Walker and Rowlinson 2020). The requirement for collaborative behaviours is typically embedded in a project's contract. Here a mechanism known as the 'pain-gain-sharing incentivization regime is used to stimulate collaboration. Thus, the 'gain' materializes from the actual project end cost being less than the target outturn cost (TOC). Conversely, the 'pain' exercised from the alliance participants' profit margins for excess actual costs above the TOC result. So, how does a 'pain-gain share regime' enable collaboration in an alliance?

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The quest to understand the influence of the 'pain-share regime's collaborative behaviours is an area that has received considerable attention. The upshot is the commonly held belief that dialogue forms the essence of collaboration and building trust in alliance teams (Walker and Lloyd-Walker 2015; Hietajärvi and Aaltonen 2018; Engebø et al. 2020; Walker and Lloyd-Walker 2020; Love, Matthews, Ika et al. 2021). However, understanding how dialogue is engendered and maintained in practice to ensure the delivery of superior project outcomes has received limited attention. Alliancing can be project-based or program-based. In this paper, we are concerned with program alliances, which involve delivering several projects bundled into a single program of work.

Against the contextual backdrop we have presented, this paper aims to address the following research question: *How does the value of dialogue influence effective collaboration in program alliances?* By addressing this research, we aim to provide academics and practitioners with a frame of reference to extract maximum value from engaging and enacting a process of dialogue through collaboration and inter-organizational learning in program alliances so that all participants achieve win-win outcomes.

Our paper commences by examining the nature and practice of alliancing and its role in delivering value (Section 2). Then, we introduce the case study and a sense-making lens to address research our question research (Section 3). Next, our research findings are presented (Section 4), and the theoretical and managerial implications of the study are discussed (Section 5). We conclude our paper by highlighting its novelty and implications for future research (Section 6).

2. The practice of alliancing and the role of dialogue

In this paper, we fundamentally suggest that dialogue within program alliancing and its projects systematically leads to cross-discipline/team collaboration and is key to generating value. Consequently, alliance teams are better positioned to develop a realistic TOC and delivery plan. The issue of optimism bias, which is typically associated with cost and time underestimation in infrastructure projects, is mitigated as the Owner Participant (OP) and Non-owners Participants (NoP) are actively involved in developing the TOC (Love, Ika, Matthews, Li, et al. 2021). A detailed review of alliancing can be found in Walker and Lloyd-Walker (2020), but for the purposes of brevity, we provide an overview to set the context for our paper below.

2.1. Nature of alliancing

An alliance, which can be project or program-based, is a consortium of design professionals and contractors who join with an owner-participant representative to form a collaborative team. The team is guided by specific and explicit assumptions about how they will assume joint responsibility and accountability and behave towards one another during a project's duration (Walker and Lloyd-Walker 2020). Alliances have a single-team mentality with a 'we all sink or swim together' level of collaboration and commitment to each other (Walker and Lloyd-Walker 2020). This mindset is supported by the contractual form, the Project/Program Alliance Agreement (PAA), which specifies and determines the amount paid to non-owner participants and their expected behaviours.

Alliancing differs profoundly from traditional project delivery approaches (Department of Infrastructure and Regional Development 2015a; Walker, Lloyd-Walker, and Jefferies 2016; Love, Ika, Matthews, Li, et al. 2021). In the case of the traditional DBB or design and construct (D&C) forms of delivery, the client/project owner takes a hands-off approach to developing the design and time/cost delivery plan. Contrastingly, alliancing involves a project owner actively engaging in a hands-on design, planning, and delivery approach. Even with Public-Private Partnership (PPP) or the Build Own Operate Transfer (BOOT) family of procurement forms, the Special Purpose Vehicle delivers the design and construction process similar to a DBB or D&C model.

2.2. Alliancing and dialogue

The concept of dialogue has been with us for millennia. Womack and Drakakis (2011) provide a literary and philosophical view of dialogue and trace its origins to classics, such as Plato and Socrates through to Oscar Wilde. So, dialogue originates from the Greek roots of *dia* and *logos*, suggesting 'meaning to flowing through'. Contrary to commonly held beliefs that dialogue refers to a debate between people seeking to defend their views, it involves a willingness to examine how problems that arise from the indirect and omnipresent *fragmentation of thought can be resolved*. Womack and Drakakis (2011) view dialogue as a process of thoroughly examining truth. Contrasting written 'truth' with dialogue, Womack and Drakakis (2011) cogently remark, 'Truth, for Plato, is permanent, unchanging and non-contradictory, whereas human speech is transient, inconstant and ambiguous. Consequently, every attempt to put the truth into words is a failure of one kind or another. The great merit of the dialogue form, from this point of view, is that it wears its inadequacy on its sleeve' (13).

Thus, we may be deceiving ourselves when we interpret the 'black ink' terms in a traditional DBB or D&C contract as the 'truth' about requirements. Perhaps the contract (and project owner's brief) is missing something to which dialogue can add value. Consider a traditional DBB or D&C contract using terms, such as 'Architect's Instruction' and 'Change Order'. What attitude does that language suggest? It can appear to be hierarchical, encouraging power command and control asymmetry. Contrast this with PAA's inclusiveness of using 'we' instead of 'you' for AMT's commitment to collective accountability and responsibility (Department of Infrastructure and Regional Development 2015b).

Womack and Drakakis's (2011) account of dialogue and its use and subtleties highlights the value of meaning to increase understanding, shared mental models, and a language that communicates collaboration and shared sense-making that is highly relevant to the value of

alliancing dialogue. The dialogue enacted between alliance participants is akin to learning a new language; it is all about learning how to share meaning (Wells 2007). Vygotsky's (1986) early research into language and thinking has influenced numerous strains of research into how people's thinking is shaped by framing linguistic terms (such as an architect's instruction) to how thought, decision-making, and action are linked.

More recently, we see people being influenced by various digital technologies, such as BIM, augmented and mixed realities, and Unmanned Ariel Vehicles being linked with computer vision to provide a contextual understanding to plan and respond to unexpected events (e.g. unsafe behaviour) (Fang et al. 2020, Fang, Love, Ding, et al. 2022; Fang, Love, Luo, et al. 2022). Additionally, artificial intelligence (AI) applications have the potential to enhance a team's ability to explore design and delivery ideas. For example, we are now seeing BIM and AI being combined, through rule inferencing, to check design compliance, as well as the emergence of machine learning modules capable of evaluating delivery options (Sacks, Girolami, and Brilakis 2020).

The concept of dialogue in alliancing can extend beyond the internal dialogue (individual mental conversations) that Vygotsky (1986) refers to and is also noted as necessary in conceptual abstraction in design thinking. While engaging in dialogue, we also participate in an external conversation with other trusted experts whose insights are valued while accessing an unconscious internal sense-making conversation with ourselves by fact-checking, plausibility assessment, and concept clarification through the incubation of ideas (Sadler-Smith 2015). An advantage of avoiding power and information/knowledge asymmetry is that dialogue facilitates a robust system of seeking 'truth'. Thus, with the context of project management, examples of 'truth' include achieving a TOC or developing a risk or uncertainty management/disaster recovery or stakeholder/engagement plan.

Senge (1990) adds a contemporary and business perspective to dialogue. He argues that dialogue 'is not about advocacy where one party wins a debate. Rather it is about exchanging perspectives on an issue to suspend assumptions and explore options that may otherwise have never been considered. It, therefore, is a value-adding tool as often surprising outcomes are achieved that are superior to any one person's or group's starting position' (241).

Dialogue is essential as it is used to express a non-belligerent form of creating shared value from knowledge, and it implies inclusive forms of project communication and organizing. Rather than imposing authority, power, or superior 'knowledge-information', the purpose is to share perspectives and opinions to test and critique impact and consequences and negotiate freely to arrive at a plausible, useful conclusion about an issue (Love 2020).

2.3. Value of dialogue

The concept of value has attracted considerable attention over the last three decades, and definitions abound (Zhao et al. 2022). However, it is well-acknowledged that value is an ill-defined concept, and people tend to have their own mental models of its meaning (Devland, Lohne, and Klakegg 2018). Perhaps the most comprehensive description of value is provided by Devland, Lohne, and Klakegg (2018), who defines it as 'the result of an evaluative judgement. This judgement is guided by values based on the evaluator's knowledge. It is always based on comparing two or more alternatives in a given context. This context envelops all get and give consequences for a particular party from a decision made based on the value judgement. The get-and-give consequences are always in the form of gained or lost experiences or expressed in monetary terms as a placeholder for experiences. The consequences are not summative; the value judgement is done by considering them all at once' (38).

Devland, Lohne, and Klakegg (2018) suggest that emphasis should be placed on the context within which value is applied; it is *context-dependent*—drawing on Devland, Lohne, and Klakegg (2018)[1] conceptualization of value we a dialogue-value framing, as noted in Table 1, to accommodate aspects of a project's life-cycle. Such a dialogue-value framing can enable conversation and provide a basis for remedying waste (e.g. rework), inefficiencies, and misguided assumptions that lead to sub-optimal project design and delivery.

Devland, Lohne, and Klakegg's (2018) definition of value provides insight into how it can be applied in alliancing contracts (Table 1). These projects usually aim to provide community benefits, not just commercial transactional returns. The community often involves the alliance participants and the broader social community the project owner serves.

When we argue that dialogue is valuable, we refer to it as having specific utility within the context of an alliance developing the TOC project delivery plan and responding to unexpected events. Within this context, dialogue is invaluable in urgent situations where quick decisions must be made and acted upon, and authoritative and expert decision-making is required. However, the TOC and delivery phases provide ample time for robust and collaborative dialogue for most alliancing projects. Dialogue's experiential, context-driven, and often emergent value changes emphasis over a project's life.

2.4. The project/program alliance agreement

As shown in Figure 1, a PAA contract typically comprises three contractual limbs (Department of Infrastructure and Regional Development 2015a; Love et al. 2016). Limb 1 is cost reimbursement. The owner pays all direct project costs and specific overhead expenses, such as the salary of the design and delivery teams, on-site accommodation, and insurance. Limb 2 is the fee for the alliance proponents' corporate overheads and profit margin. Limb 3 is the commercial agreement that specifies the incentive arrangements, which includes how 'pain' or 'gain' will be shared by the project participants (Department of Infrastructure and Regional Development 2015a).

Table 1. Proposed dialogue values in alliances.

Dialogue value	Discussion of relevance to project cycle
Information exchange—increasing access to data, information, and knowledge.	Improved informed cross-disciplinary insights: in decision making at the TOC/TAE development phase; in planning resilient action at the delivery stage; gaining facility operation and client representative team insights preparing for the operational phase and how best to transfer as-built data, and cross-disciplinary insights to feasibly design for practical recycling and disposal.
Innovation—encouraging new approaches and ideas.	More holistic cross-disciplinary team insights: feeding into 'workable' product, system, and process innovation at the TOC/TAE development phase; resilient innovative action response to risk-opportunity events at the delivery phase; operational and project owner innovation-scanning to improve operational phase efficiencies to the network-system; and cross-disciplinary insights to design-in innovations for practical recycling and disposal.
Organizational learning—transfer of learning across boundaries.	Cross-disciplinary and cross-project insight capture and diffusion: to teams' home organizations at the TOC/TAE development phase; for effective diffusion of knowledge during the delivery phase: to facilitate contextual knowledge and learning transfer to facility operators; and improve contextual knowledge and learning transfer applicable at the recycling and disposal phase.
Psychological safety—inducing a mentally safe, respectful, and rewarding workplace experience.	Improved validity of considering awkward 'truths' with a more familial ambience: during the TOC/TAE development phase; preparing for resilient action required resulting in a comfortable, holistic consideration of unexpected event classes and improved knowledge and appreciation of the power of collective action during the delivery phase; facilitating operations and project owner teams' feedback being more salient to guide design/delivery plans; and facilitating all teams' motivation to make a positive environmental impact, feel more responsible and gaining more meaningful feedback on design/delivery for recycling and disposal.
Relationship building—facilitating teams to understand and respect each other.	Enhancing positive cross-disciplinary and cross-team integration and collaboration opportunities: to build trust at the TOC/TAE development phase; to create a best-for-project mindset helping teams build a common project identity at the delivery phase; to build facilities operational team confidence and trust in the design and delivery team; and creating common team identity to promote best-for-project procedures for the brief to include considering recycling and disposal strategies.
Monitoring and control—facilitating a more collective shared view of responsibility and accountability.	Providing a more inclusive unified team sense of responsibility and accountability in general and: improving preparation for the unexpected and unanticipated event accountability at the TOC/TAE development phase; to facilitate greater preparation for the unexpected and improving resilient responses to realized risk events at the delivery phase; generating greater certainty about the delivered facility's detailed deliverables to add value for the operational project phase, and proposing solutions to assumed recycling and disposal strategies being monitored and controlled through key performance areas and indicators.
Effectiveness—through minimizing waste and rework.	Providing a more inclusive unified team sense of responsibility and accountability that focuses on sustainable project outcomes through the use of digital visualization and immersive design tools to more effectively anticipate and prevent situations that may cause waste/rework at the TOC/TAE development phase; to use these tools to overcome issues that arise during project delivery resiliently and to facilitate opportunity exploration rather than relying on risk response action; the facilities operations team can help in reducing rework and waste that may occur at project hand-over phase; and being aware of the rework/waste impact at the recycling and disposal phase.

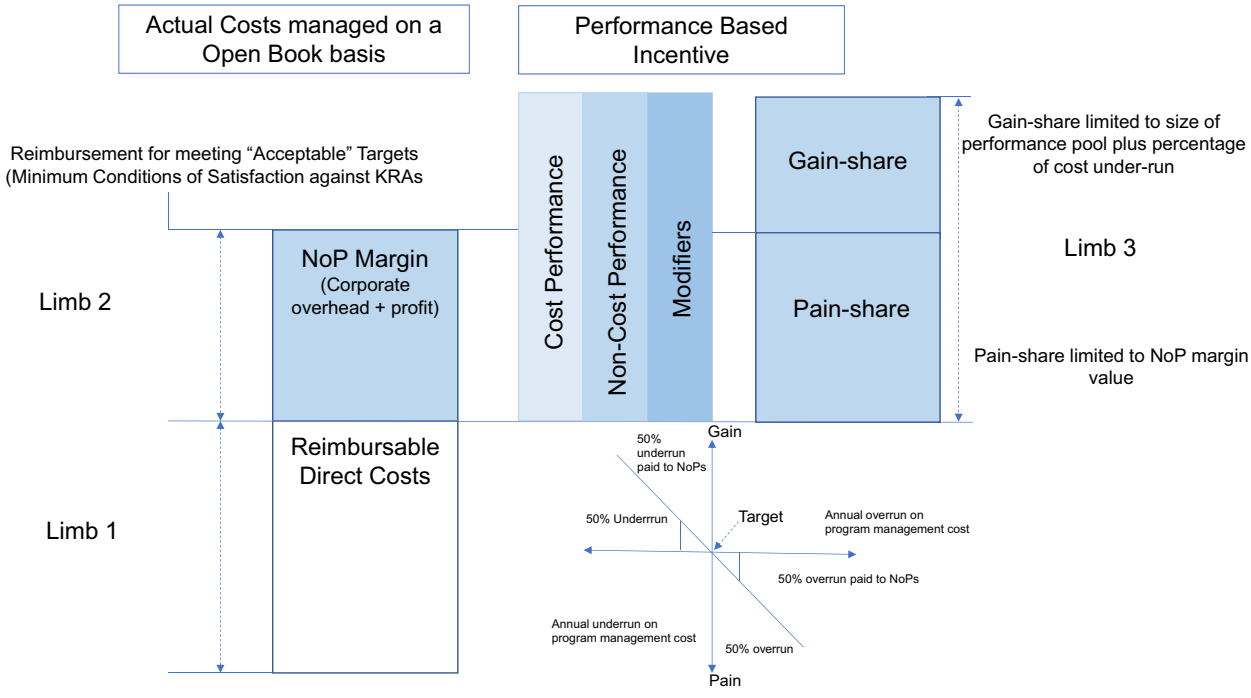


Figure 1. Compensation model: 'Pain-gain share regime' (Love et al. 2016).

The design, contractor(s), project owner, and often the facility operator teams jointly develop a design solution and delivery plan at the Alliance Development Agreement (ADA) stage. This phase of an alliance is referred to as the TOC, akin to the design development process. The TOC phase determines the project's estimated cost and time and includes detailed plans to deliver it according to the assessed objectives (Walker, Vaz-Serra, and Love 2022). This is independently benchmarked against a similar reference design to assure its competitiveness. Once the TOC is accepted at the ADA stage, the project owners and facility operator teams often form an alliance under the PAA.

The Limb 1, the TOC forms the basis for Limb 3, 'pain-gain sharing'. The Limb 2 'fee' is placed at risk. It delivers a gain-sharing bonus when the project end cost is under the TOC result or a pain-sharing penalty when the actual cost exceeds the TOC results. The project owner is an alliance participant who shares in the 'pain-gain sharing' (Department of Infrastructure and Regional Development 2015a). The focus is on a project's delivery performance, not on individual teams. By focussing on the project, the alliance team develops a mindset where they all 'sink or swim' together.

A detailed examination of the TOC development process can be found in Walker and McCann (2020). Generally, it takes between six-nine months to complete the TOC phase. Throughout the period, the design and delivery teams collaborate as an integrated team under an ADA, with the facility operator team and project owner team engaging in workshops to clarify essentials of the project brief, identify and assess risks and uncertainties and resolve target adjustment event (TAE) classes that the owner is best able to manage should they occur (Walker, Vaz-Serra, and Love 2022).

Alliancing's risk-uncertainty management is far more integrated and collaborative than traditional delivery approaches. The TOC process drives the collective dialogue during the project design and preparation phase. Collaboration is an emergent process of reciprocal actions by people to achieve a jointly agreed-upon objective (Bedwell et al. 2012). Much of its value lies in people with varying perspectives having different knowledge about proposed actions and their consequences to minimize or eliminate the unintended negative flow-on impact.

As we mentioned above, the second important feature of alliancing is the PAA. This agreement has specific behavioural requirements, such as respect for individuals' expertise and knowledge and their ability to contribute ideas and insights. Additionally, the agreement requires the formation of an Alliance Management Team (AMT) (similar to a project control group in traditional delivery forms) and an Alliance Leadership Team (ALT) project steering committee comprising senior executives from the owner and NoP parent organizations to establish a governance structure.

The focus on project performance, rather than the individual team's, encourages the AMT and ALT to respond collectively on a best-for-project basis. As a result, the AMT and ALT focus on realizing the project's vision by engendering an environment that supports collaborative behaviour and collective learning (Andersen, Klakegg, and Walker 2020). Collaborative behaviour is not confined to the alliance team but is promoted throughout a project's supply chain (Hall and Scott 2019; Matthews, Love, Ika, et al. 2022). Indeed, the desire and drive of alliances to engage in collaboration results in successfully achieving project outcomes (Manley and Chen 2017).

The alliancing literature is replete with case studies explicitly demonstrating collaboration as a process of sharing knowledge, information, and insights on likely impacts and questioning design/planning assumptions (Holt, Love, and Li 2000; Hauck et al. 2004; Zimina, Ballard, and Pasquire 2012; Farzad et al. 2019). Sharing insights, expertise, and information requires trust between collaborating participants within a low power-information asymmetry workplace. Systemizing shared experience is also essential to diffuse knowledge across a program of projects, so recognizing and trusting the value of 'experience-in-context' is vital. Alliancing trust has been unpacked into individual and organizational ability, integrity, and benevolence elements where parties share confidence in each other to collaborate freely (Davis and Walker 2020).

Project delivery systems that support the questioning of design/delivery assumptions are healthy and to be encouraged. However, the system needs to deploy a 'no-blame' environment where participants demonstrating low power/influence asymmetry are expected to challenge assumptions and 'best practice' to offer innovative alternatives. Intellectual and psychological safety in the alliancing workplace context is accepted and encourages perspective-taking diversity (Lloyd-Walker, Walker, and Mills 2014).

What practical value does this 'fearless' perspective-sharing offer? Arguably, it challenges orthodoxy and promotes innovation, gathering cross-disciplinary teams into a single entity that aims for best-for-project outcomes can unleash creative energy that delivers out-of-the-box thinking. People are forced to challenge their assumptions (Parker, Atkins, and Axtell 2008). But where does perspective-taking lead? Fundamentally, to a different process from traditional project delivery systems.

Traditional approaches are highly influenced by institutionalized received knowledge about 'best practice'. The institutionalized cross-project approach locks in strategic delivery options relying upon codified 'knowledge' bases, such as the Project Management Institute Body of Knowledge and other similar sources claimed to be 'best practice' (PMI 2017).

Alliancing is pragmatic and open to norm-disruptive approaches that deliver the desired project outcome. For example, IPD is gaining acceptance in the US as a standardized approach for procuring complex projects (Cohen 2010; Zimina, Ballard, and Pasquire 2012; Walker and McCann 2020). Alliancing case studies in Australia illustrate how their adoption stimulates critical thinking within project teams and the emergence of incremental and radical innovation. Notably, innovation is typically an alliance key result area (KRA), and performance is incentivized (Walker and Lloyd-Walker 2020).

The establishment and promotion of a questioning mindset by individuals and teams are openly encouraged in alliances (Walker and Lloyd-Walker 2015; Love, Ika, et al. 2022). When individuals and groups engage in this sort of conversation—uncertainty is assumed, and diverse knowledge and expertise are drawn upon—a proposal can be critically evaluated in an intellectually safe space.

3. Research method

We adopt a sense-making approach to address our research question and the corresponding propositions. Sense-making provides a frame of reference to understand how people experience and make sense of dialogue and the ensuing collaboration that manifests in a program alliance (Love and Matthews 2022). Following such a line of inquiry lends itself to adopting an interpretive case study as we aim to provide novel and profound insights into the value of dialogue and its influence on collaboration in program alliances.

Our approach to sense-making rests upon the assumption that people make sense of their workplace (i.e. project) at all times. How they do so and think and speak about making sense of it reflects their behaviour and the overall project's organizational culture in practice (Dervin 1998). Our assumptions are informed by methods that elicit and analyze project processes based on people's everyday experiences. By adopting a sense-making approach, we can regulate 'the cacophony of diversity and complexity without homogenizing it' (Dervin 1998, 36).

3.1. Case study

Case selection is the 'primordial task' of case study research as it establishes the framing of a phenomenon to be studied (Seawright and Gerring 2008, 294). The cases we have selected for this study were based on pragmatic considerations (i.e. their availability and access) and theoretical prominence, which are 'legitimate factors in case selection' (Seawright and Gerring 2008, 295). We focus on the 'program of projects' context and draw on the experiences of two case studies: (1) AU$375 million water infrastructure (XY); and (2) AU$14.8 billion transport infrastructure program alliance (XZ).

Our involvement in the XY program alliance arose from an invitation to provide initial advice on addressing rework in their projects. Our initial involvement began in 2013 until its completion in 2015. We also examined how effective the collaborative experiences and practices learned by the alliance were for new and smaller projects undertaken by the owner post-alliance.

In the case of the XZ program alliance, we have been actively involved with one of the five project alliances within the program since 2019. This involvement arose after a workshop (November 2018), which had been organized with all the alliances to discuss rework. It was a problem that had been identified by the project owner and was impacting the performance of projects. Due to our involvement with the XY program alliance, we were invited to work with members of the XZ to examine their rework problem in 2019.

Thus, we use the problem of rework as our framing to demonstrate the power of dialogue manifested in the program alliances spanning multiple projects. We have adopted a longitudinal study of rework in program alliances; XY is complete, and XZ is ongoing. Aside from the value of dialogue that is examined in this paper, we have also examined other issues associated with rework in the alliance cases, such as their error causation (Love and Ika 2022; Love, Matthews, et al. 2022), error culture (Love and Matthews 2022) and ontology development (Matthews, Love, Porter, et al. 2022).

3.2. Data sources

Details about each project and the data sources used to garner our insights to address our research question can be seen in Table 2 for each project. Also, details about the interviewees are presented in Tables 3 and 4. The data we have acquired from these projects is voluminous and rich in content—it has been collected over several years and continues to be for the XZ alliance. In the case of program XY, we initially conducted 26 semi-structured interviews about issues surrounding the functioning of the alliance, its processes, leadership, management, communication, knowledge-sharing practices, and how and why rework occurred.

We also undertook 19 semi-structured interviews with the XZ alliance. We were also provided unlimited access to its project-based documentation, attended contractor/subcontractor workshops where problems (e.g. rework) were discussed, and people were encouraged to air their concerns and suggest ways to address them. After the construction of the projects, follow-up workshops were undertaken to determine if lessons learned had been enacted and applied to their new projects.

3.3. Narrative analysis

Our previous research that has examined rework in the alliances has used a variety of analysis techniques, such as thematic (Love and Matthews 2022), content (Love, Ika, et al. 2022), and statistical (Matthews, Love, Ika, et al. 2022). We draw on our observations, acquired insights from being involved in the alliances, previous works, and unreported data to provide a narrative analysis of dialogue. Narrative analysis 'refers to a cluster of analytic methods for interpreting texts or visual data with a storied form' (Figgou and Pavlopoulos 2015, 546).

As part of the interviews we have undertaken, people were invited to provide stories to help organize and make sense of the alliances functioning and structure. We specifically adopt a dialogic narrative analysis, which focuses on the context and takes a multi-voiced and co-constructed view to generate an understanding of a problem (Kohler Riessman 2008). Thus, we use examples from our data to support and address our research question.

Table 2. Project details and data sources.

Project	Description	data sources			
		Interviews	Documentary	Meetings/workshops	Observation
Water infrastructure program alliance (XY) Cost: AU$375M Time: 5 years	The program alliance was established in 2009 to deliver 129 water infrastructure projects comprising pipelines, water treatment plants, tanks, storages, and channel works throughout regional areas of Victoria in Australia. The program of work was required after an extended period of drought and significant growth in population in the region, and the demand for water increased. There was a need to upgrade existing and construct new infrastructure. The alliance comprised three organizations: (1) the OP, responsible for delivering water to its customers over an area of 8100 km2. A total of 275000 customers needed to be serviced; (2) an engineering firm who provided design, environmental, and stakeholder management expertise; and (3) a contractor who offered commercial and construction expertise	In the project's final year, 26 Semi-structured interviews were undertaken with a range of alliance participants, including subcontractors ranging from 25 to 141 minutes. Interviews were digitally recorded. Supporting these interviews were informal discussions (notes were taken) covering a range of issues, such as communication practices, knowledge sharing, leadership, and culture	We were provided complete access to the alliance's documentation, including safety records, non-conformances, lessons learned, innovations register, project reviews, progress meetings, construction kick-off meeting minutes, monthly reports, and the PAA.	Meetings with the alliance took place during and after post-construction. We participated in two contractors' workshops examining how errors and rework could be reduced in projects. Workshops were undertaken after projects were completed. Regular knowledge-sharing forums were also undertaken, which we also attended. Post-completion workshops involving four contractors were undertaken (12 h)	Visits to six sites and informal discussions with the site management team and subcontractors for two days. Additional visit to three sites post-completion of the project to identify any post-construction issues for two days.
Transport infrastructure program alliance (XZ) Cost: ≈AU$16.3B Time: Ongoing	A state government in 2014 committed AU$2.4 billion to remove 50 of its most dangerous and disruptive level crossings and rebuild 51 railway stations in the metropolitan area of a major city. The project commenced removing crossings in 2015. However, with election cycles and re-election of the incumbent government, this has now increased to 110 to be completed by 2030. Solutions include rail under (tunnel/underpass), rail over (bridge/elevation), closing off, and a hybrid. The program of work involves five alliances. Each alliance comprises (1) the OP; (2) two engineering design firms; (3) contractors, and (4) a rail operator. The project is the largest rail infrastructure project in the state's history.	A total of 19 semi-structured interviews ranged from 26 to 60 min. Fortnightly informal discussions about issues in the alliance between February 2020 and February 2021 via MS Teams. Informal meetings are now undertaken monthly to report and discuss ongoing research findings from documentation analysis.	We have been provided access to the following documentation: non-conformances, internal/Requests for Information (i/RFI), lessons learned, site dairies, project close-out reports.	Two authors regularly participate in the War on Waste initiative as part of the alliance's continuous improvement program. Issues being addressed relate to using technology to monitor rework and how lessons can be shared. Training programs/workshops have been designed to communicate to site management and subcontractors about rework issues and hear their concerns,	The authors have yet to visit sites as, during COVID-19, this was not possible.

Table 3. List of interviewees and workshops for XY alliance.

Data source	Functional area	Length (h, min)
Alliance		
Alliance manager	Alliance leadership team	0:42
Project director	Alliance leadership team	0:52
Chairman	Alliance leadership team	0:20
Design manager ($n = 2$)	Design	1:06
Delivery manager	Project management	0:24
Design team leader	Design	1:18
Commercial manager ($n = 2$)	Project management	1:19
Systems engineer	Asset systems	0:24
Risk, quality, and support team leader ($n = 2$)	Asset systems	0:37
Safety, quality, and environment (SQE) manager ($n = 2$)	Construction	0:31
Construction manager	Construction	0:25
Project managers ($n = 6$)	Project management	3:21
Project engineer	Construction	0:25
Site managers ($n = 2$)	Construction	0:29
Site supervisor	Construction	0:25
Foreman	Construction	0:44
Contractor rework forum (35 participants from the alliance, consultants, and contractors)	Alliance management team, design, project management, and construction	1:30
Post-completion		
+6 months—group meeting with XY water staff which included infrastructure and operations manager, systems engineer, three site supervisors, and external consultant	XY water	2.05
+1 year—group meeting with key XY water staff, which included two site supervisors, project manager, and operations manager, and an external consultant	XY water	1:46
+2 years (workshop, non-participant observer included four contractors, engineering consultants, site supervisors, and XY water project management team. A total of 35 participants with $1^1/_2$ h × 8 of audio data)	XY water and project team	12:00*

*simply means greater than +.

Table 4. Sample of interviewees for the XZ program alliance.

No.	Interviewee*	Time (min)
1	Project engineer	40:19
2	Design manager	37:39
3	Quality manager	60:14
4	Project engineer	26:52
5	Design manager	53:58
6	Design coordinator	49:41
7	Quality manager	41:39
8	Project engineer	55:54
9	Superintendent	36:01
10	Project engineer	45:03
11	Construction manager	26:21
12	Subcontractor	48:24
13	Planning manager	39:34
14	Senior project engineer	31:40
15	Engineering coordinator	43:49
16	Planning manager	39:18
17	Subcontractor	32:41
18	Engineering manager	28:54
19	Commercial manager	44:11

*For confidentiality, a generic title of the interviewee is used.

4. Research findings

Using multiple data sources and reflecting on our involvement in both program alliances, we have observed that dialogue forms the crux of the collaboration process. Retrospectively, dialogue is demonstrated through a dialogic loop enabled by collaboration. We observed that dialogue within the alliances manifested through (Kent and Taylor 2002): (1) *mutuality*, or a recognition of the PAA and 'one-team' ethos; (2) *propinquity*, or the temporality and spontaneity of interactions between team members and contractors; (3) *risk*, or the willingness to interact with individuals, teams, and contractors on their terms; (4) *empathy* or the supportiveness and confirmation stakeholder goals and interests; and (5) *commitment*, or the extent to which the alliance gives itself over to dialogue. These underlying principles of dialogue interact with one another and thus cannot be treated as mutually exclusive.

The ensuing conversation between people at all levels within the alliance and its projects provided the basis for collective learning to emerge and be enacted. It was widely considered by the ALT/AMTs that complex issues require intelligence beyond that of individual members. For example, in the case of the XZ alliance, production pressure was a significant constraint impacting them as the program of work had become political inasmuch as there was a need to realize the benefits of the works as soon as practically possible.

In addition, alliance deliverables were being benchmarked by the project owner, so there was added pressure to perform. The engineering and construction teams jointly derived a way to combat production pressure by taking a 'adopt, adapt, and innovate' approach to design and deliver, enabling them to derive new solutions using prevailing knowledge and resources. The solution emerged through a process of reflection during a workshop; not everyone agreed on adopting a used design, resulting in a sub-optimal solution. However, people could reflect in unity and participate in a pool of shared meaning. The upshot was that the engineering team's actions became aligned though production pressure is an ever-present reality.

In both program alliances, the ALTs displayed attributes of authenticity. They actively listened, led with vision, focussed on long-term results, promoted open communication, consistently reinforced expected behaviours, and shared successes and achievements with the alliance team members and contractors. For example, in the XY program alliance, a contractor in one project constructed a 4 km pipeline without performing any rework—this was a major success. It was celebrated with a barbeque, and lessons were promoted throughout the alliance.

Even though the dialogue was enabled and encouraged, there remained a reluctance to 'speak up'. This is a left-over legacy from a traditional procurement environment where conflicts reside. Teams also tend to break down and revert to rigid positions where people cover up issues out of fear. As a consequence of not speaking-up, the efficacy of collective learning and inquiry was hampered. However, the ALT/AMT were cognizant of this issue and, in doing so, constantly reinforced the need for conversations to enact change, stimulate process improvement and generate value (e.g. learning, relationship building, and waste reduction).

We now address our research question and use the context of rework to demonstrate how dialogue is used in practice using the following clusters that emerged from our narrative analysis: (1) facilitating effective individual-team dialogue; (2) cross-team discipline collaboration tools; and (3) cross-discipline dialogue. In both alliances, rework was a problem. Even though dialogue was practiced, failures in negotiated order stemming from a reluctance to 'speak up' often led to misunderstandings, misinterpretations, role ambiguity, communication breakdowns, and interactions between project participants. In both program alliances, encouraging and reinforcing the need for people to 'speak up' and build trust was a mission for the ALT/AMT.

4.1. Facilitating effective individual-team dialogue

In the XY program alliance, projects were regularly delayed during the first two and a half years into their five-year contract. It was revealed at a workshop examining how the alliance's performance could be improved that having to perform rework was a problem. On average, projects were experiencing delays of three weeks due to rework. Furthermore, it was discovered that 40% of safety incidents had occurred while performing rework. Recognizing the need to address the problem of rework, XY's ALT and AMT developed a dedicated strategy to instigate change where quality became a KRA within the alliance. Notably, quality is not normally considered a KRA in an alliance contract—this was the case for the XZ alliance.

While a 'no-blame' environment prevailed, information capture, sharing, and communication of rework had not been in place. Rework had been viewed as uncomfortable knowledge (i.e. denied, dismissed, diverted, or displaced) or as a one-off event. It was a normal practice not to have systems to monitor and manage rework in place. Even though a 'no-blame' frame of mind was ever-present, project team members and subcontractors had been reluctant to 'speak up' about poor quality, not out of fear but a reluctance to be seen as incompetent. Moreover, non-conformances have traditionally been viewed as a measure of poor performance.

The mindset within the XY alliance was that 'errors can and need to be prevented' (i.e. error prevention). The ALT/AMT recognized that if headway were to be made to combat rework, it needed to modify its mindset and embrace the notion that 'errors happen' (i.e. error management). The ALT/AMT, in conjunction with the project team and subcontractors, developed a 'rework reduction program', where practices were created to block or reduce the negative consequences of errors resulting in rework through design and training.

These organizational practices related to communicating about errors, sharing error knowledge, helping in error situations, analyzing errors, quickly detecting and handling errors, and coordinating error handling were implemented—the implementation of these organizational practices in place aided collaboration with the XY alliance and each project's various subcontractors. The ALT facilitated individual team dialogue, reinforcing psychological safety throughout all levels of the project by promoting self-awareness, encouraging active questioning and positive dialogue, providing reasons for change, and emphasizing errors are a source of learning innovation (Edmondson 1999).

The XZ program alliance was well aware of the successes of XY's approach to facilitating effective individual-team dialogue. The project team members of XZ had been involved with the XY alliance. So, learnings were readily transferred within and across projects. Engaging subcontractors and involving them in the conversation around errors and rework enabled issues to be openly discussed, trust to be built and progress towards their mitigation to be made.

During project toolbox meetings, site supervisors and subcontractors discussed the likelihood of rework risks. Coordination meetings were undertaken every day at 2 pm to examine the next day's work. There was a view that 'we are all in this together, especially with dealing with the issues of COVID-19. The diverse nature of the alliance project team, represented by two engineering houses, a constructor and an asset owner, embraced collaboration and the 'no-blame environment, with an interviewee describing it as having a 'just culture'.[2]

Errors arising during construction were reported to the design engineers through regular design reviews and lessons-learned forums. The dialogue between engineering and construction teams provided learnings to support the 'adopt, adapt and innovate' design approach, contributing to reducing errors and rework and improving productivity. A significant issue facing the XZ alliance was that while it was capturing a mass of error and rework data, it was being captured and stored in different locations and formats, which hindered its ability effectively understand the full extent of occurrence.

Acknowledging this shortcoming, the program alliance initiated a process to develop a system to enable all rework information to be accessible and derived from its projects for decision-making and risk management purposes. It is

envisaged that construction teams across the alliance's projects will use the system to jointly assess rework risks through dialogue with subcontractors. Thus, enabling greater coherence between them and an understanding of the problems impacting practice. While an agenda of rework mitigation forms the heart of the dialogue, the intention is not to deliberately draw on previous practice to solve the problem but open up a possibility of shared thinking to formulate new insights and opportunities to address the issue from a practical perspective.

4.2. Cross-team discipline collaboration tools

Technology-enabled solutions, such as ProjectWise, which can help project teams manage, share and distribute engineering project content and review in a single platform, have an essential role in facilitating cross-team collaboration in projects. Information and knowledge can be rapidly shared and communicated, enabling collaboration within alliances to flourish. However, the effectiveness of technology is only as good as the data structures, and information inputted into a system and communicated to people.

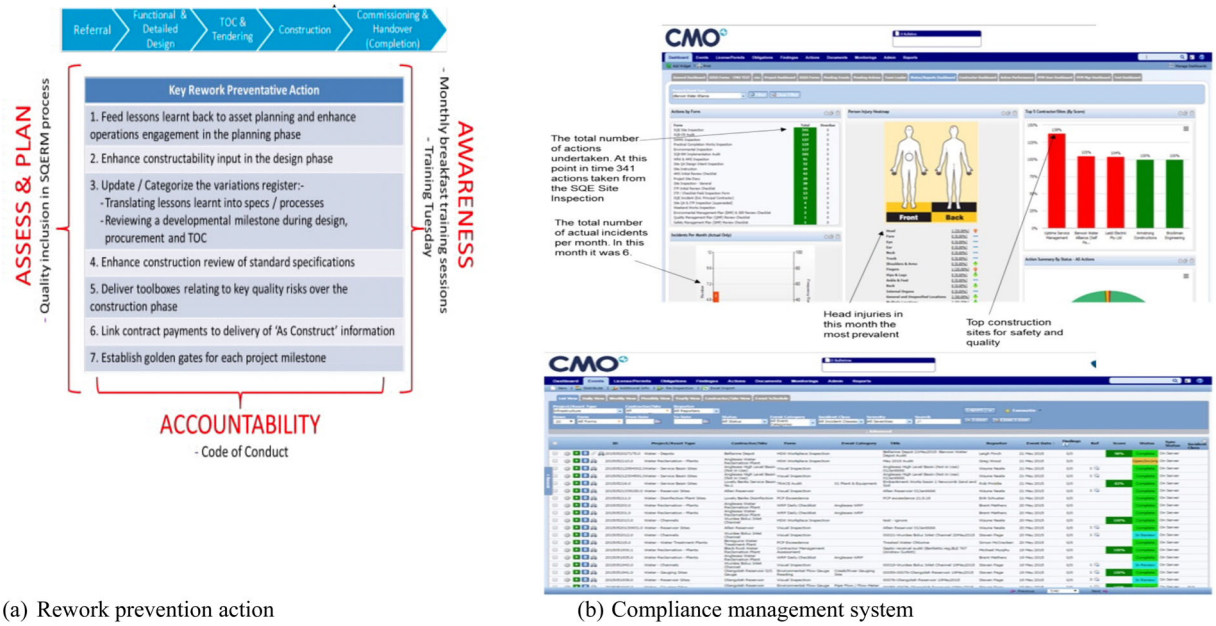
We do not discount the benefits of technology; quite the contrary. It is the nature of an alliance's culture, which tends to be generative, that enables information to flow and be communicated. Put simply, 'by examining the culture of information flow, we can get an idea of how well people in the organization are cooperating and how effective their work is likely to be' in ensuring quality (Kent and Taylor 2002, 58).

So, when information does not flow, it can adversely affect the functioning of a project. Adopting new organizational practices from implementing the 'rework reduction program' within the XY program alliance enabled an error management mindset to thrive within and between projects. New tools and processes were also developed to facilitate dialogue and learning across alliance projects within the program. The overarching process developed to record, document, share and communicate errors resulting in rework and ensure compliance is presented in Figure 2.

Alliance members and subcontractors regularly attended workshops to listen to people's rework stories and engage in knowledge sharing. The ALT/AMT hired an external consultant to coach staff to give them the confidence to actively 'speak up' and input data into the designed compliance management system so that knowledge could be accumulated and readily shared and discussed formally and informally. The workshops and regular lessons learned forums provided a context and the interaction required for a shared meaning to manifest. It is the basis of an alliance's collaborative framing that enables dialogue and understanding about problems to be addressed in a mutually beneficial manner.

The XZ program alliance was aware of how XY had reduced its rework in its projects; several site engineers and supervisors had worked on the XY alliance. As a result, XZ developed similar tools and processes to manage errors and rework. During the engineering design process, BIM was used to support the collaboration between the design team. Here BIM provided the ability to coordinate and handle errors, with an interviewee stating: 'Our reliance on BIM [building information models] allows us to attend to issues [errors and changes] from an interdisciplinary perspective. We can notify all affected by a problem'. Those impacted by changes in the BIM were encouraged to 'ask why' to enable an explanation to be provided by asking 'why'; there was a likelihood that other issues could be identified.

Due to COVID-19, the engineering team was forced to work virtually due to a series of lockdowns. Working in isolation and as part of a team was a challenge, but as an interviewee stated: 'The language we use in this project is collaborative. The culture is nurturing. You know, there's a



(a) Rework prevention action (b) Compliance management system

Figure 2. Examples of processes and tools used to facilitate dialogue, prevent and learn from rework. (a) Rework prevention action. (b) Compliance management system.

support network, and a sort of selflessness comes through due to the culture. It is enjoyable to be in this culture where you know it's very supportive'. Design teams had to work virtually, hindering their ability to informally clarify and discuss engineering issues and obtain an immediate response to queries and problems.

Without face-to-face dialogue, which is multimodal (i.e. combining speech with hand and facial gestures), the nuances of conversation and language were sometimes lost. After all, face-to-face dialogue is the primary and universal form of language use, enabling reciprocity and constant moment-by-moment interchanges to unfold and meaning to emerge! Virtual working (e.g. Microsoft Teams) required additional time and effort to synchronize the design and documentation of engineers to mitigate coordination errors. Hiccups due to bandwidth issues caused a few problems. Still, the engineering design team's drive, willingness, and selflessness, consistent with a best-for-project approach, enabled the benefits of the technology to be realized.

The notion of collaboration was not confined to the alliance *per se* but was extended through its supply chain. For example, on-site, the lean tool, Last Planner®, and the software Touch Plan were adopted to enable the site management team to work collaboratively with their subcontractors and suppliers. In this instance, pull planning took place, which involved bringing together team members to jointly identify and isolate key project milestones and then work backwards to add all details and requirements. Touch Plan acted as a medium through which dialogue was ensured, enabling likely risks that may result in rework to be assessed and managed accordingly.

4.3. Cross-discipline dialogue

As the alliances comprised a program of works, projects tended to be constructed or had entered their operational phases while others were being designed. The lessons from completed projects were systematically fed into new ones to identify design, procurement, materials, safety, cost, and schedule risks. The ALT/AMT encouraged open communication between project team members and their contractors in both alliances. The free-flowing exchange of information, facilitated by social and technologically-enabled channels, between project team members was central to their functioning (Table 2). Getting people to 'speak up' was the primary mission of the ALT/AMT. With the perseverance and support of the alliance members, the walls of those who were reticent to 'speak up' began to crumble. However, we must point out that some people were still reluctant to 'speak up'. So, generally speaking, people within the program alliances felt safe when speaking up about issues without embarrassment and their voices being rejected and feeling they would be punished.

Having a centralized office where the engineering design, delivery, commercial, development, and support services teams were co-located provided the foundations for cross-disciplinary dialogue and collaboration to burgeon. In the case of the XY alliance, before the commencement of a new project, the engineering and construction teams would visit the site together and discuss 'how' the design and its potential constructability may develop. The involvement of the construction team was essential for providing feedback about errors arising from previous projects.

Creating awareness by gathering data and providing the AMT with insights about the performance of a project and people enabled the alliance to contain and reduce errors and continually re-evaluate the state of their defences. The alliance knew that to mitigate rework and improve safety, it needed to routinely monitor and prioritize people's well-being (e.g. introducing flexible working conditions, workload management, and regular social events).

The XY alliance also sought to build relations with its local subcontractors and communities where projects were delivered—dialogue extended beyond the immediate alliance team and the 'taken for granted' ways of thinking of stakeholder needs cast aside. The alliance aimed to help local subcontractors build capacity and acquire new skills and knowledge. Once the program of works had been completed, it was envisaged that the subcontractors would have the requisite experience to maintain key infrastructure assets for the local water authority. This was operationalized through KRAs, targets, and key performance indicator measures. As subcontractors became experienced, the alliance ensured its TOC was met, its rework was reduced, and safety improved.

The XZ alliance's program of works is significantly larger and more complex than XY's. When we conducted our research, four of the eight projects it had been contracted to deliver had been completed. As we alluded to above when we conducted our interviews, interviewees were in the midst of a 'lockdown' due to COVID-19, and thus, technology played a significant role in enabling dialogue. The XZ alliance was aware that its productivity and performance were being impacted by waste (i.e. Muda, something that adds no value).

Rework and its associated wastes, such as transportation and waiting, had the most significant impact on operations on-site. A dedicated continuous improvement team was established to tackle the 'War on Waste (WoW)' that not only looked at ways of combating rework but acted as a conduit for initiating relations and facilitating dialogue between various functional areas of the alliance (e.g. administration, engineering, and delivery).

Representatives from the WoW, for example, regularly engaged with employees from each of the functional areas, though informally, to solicit examples of rework and try to understand why it was emerging to stimulate learning. Such discussions were also undertaken with contractors to ensure 'best-for-project' solutions could be developed to contain and reduce the resulting rework. But more importantly, it allowed the WoW team to provide feedback to the ALT/AMT about building operational confidence that effort was being made to monitor and control rework. However, as pointed out above, the absence of information structures to capture rework hindered these tasks.

Nonetheless, there was a general desire and drive to address rework, and openly communicating and sharing knowledge about its presence enabled various functional areas to discuss its occurrence and raise awareness of the problem. Engendering dialogue across multiple functions within an alliance mega-project is a challenge, especially if it is meaningful and results in performance improvement. However, the WoW team has unified the alliance to mitigate rework by encouraging team members to engage in dialogue and taking on board suggestions to improve processes. Naturally, without the commitment and support of the ALT/AMT, the WoW Team would not be able to promote the elimination of waste and drive the alliance's value-creation strategy set out by the PO and enacted through the KRAs. In sum, our proposed 'dialogue values' in Table 1 were enacted in various forms in the alliance projects. By addressing errors, the likelihood of latent defects and failures occurring in the operation of assets is significantly reduced.

5. Discussion

Our research has sought to address *How does the value of dialogue influences effective collaboration in program alliances?* Findings from this research show that the PAA and collaboration tools and processes enable individual-team dialogue and foster new organizational practices. Indeed, these new practices juxtaposed with principles of alliancing enabled an error management culture to be developed–our previous research confirms this observation (Love and Matthews 2022) and is enhanced by context-rich cross-project experience and knowledge sharing. In such a culture, the ALT aims to support people's well-being, anticipate what might go wrong, adapt and learn by encouraging exploration and experimentation, and simultaneously accomplish the KRAs and broader stakeholder needs. How information is handled and processed is central to determining an alliance's culture, with dialogue being the medium to enable collective learning. We serendipitously discovered the power of dialogue in the program alliances while reflecting and thinking about how the problem of rework was tackled in such complex settings.

Our findings indicate that dialogue value emerged in various guises enabling the alliances to enact change not by 'learning from' errors and rework events but by systematically altering the organizational processes to ensure the alliances 'learns through' them (i.e. how to handle their occurrence) (Westrum 2014). As a consequence of collaboration and the promotion of dialogue in alliances, members become more aware of their tacit assumptions derived from their cultural learning and psychological makeup (Issacs 1999).

According to Isaacs (2001), to practice dialogue, three fundamental levels of human interaction are required to foster a 'thinking together' mindset:

1. *Producing coherent actions by avoiding contradictions between 'what we say' and 'what we do'*. In the case of the alliances we have examined, the PAA's contractual language coherent actions were made explicit with the use of 'we' enabling a 'one-team' mentality underpinned by a pain-gain incentive regime to be established and reinforced with the value of dialogue
2. *Creating fluid structures by developing predictive intuition—a capacity we need to read people's intent, goals, and ways of seeing the world*. Engaging in dialogue with subcontractors (also stakeholders) to listen to their ideas about how to mitigate rework contributed to the collective learning that was embedded and enacted in each of the alliances; and
3. *Becoming more conscious of the invisible atmosphere in which our conversations take place and how they influence the way we think and act*. Providing a psychologically safe environment where people (e.g. alliance team, subcontractors, and suppliers) could openly 'speak up' and be listened to initiated conversations that amplified the power and value of dialogue, which supported the development of collaborative behaviours (e.g. trust).

When we 'speak up' our 'voice reveals what is true for each of us, regardless of other influences and social conventions' (Bonadona 2002, 331). Thus, 'to be able to say what we really think and feel' not only requires courage but practice in an environment that allows you to do (Bonadona 2002, 331). Alliancing provides this environment as error-making can happen without fear of blame, leading to learning and innovation.

Dialogue allows us to understand and provide meaning to a problem. The ability of people to think and engage in conversation explicitly impacts the effectiveness and functioning of alliancing and projects in general. Learning to communicate openly in an alliance environment where people have been conditioned to deliver projects using a traditional approach can be challenging. However, through open and honest communication, we can understand and accept the 'diversity of voices' that exist in an alliance (Bonadona 2002, 332).

Reflecting on the two program alliances we have studied, our discussions with practitioners involved with their delivery have enabled us to provide insights into the value and power of dialogue in addressing rework. We hasten to note a limited number of studies have examined 'how' projects delivered by a program alliance function effectively. While the projects we have considered in this paper are unique, the findings offer a learning opportunity about how governments can effectively utilize relational project systems to deliver infrastructure assets and obtain best-value outcomes. The next section of this paper presents the theoretical implications of our findings in a broader context.

5.1. Theoretical implications

We have shown that dialogue is critical for addressing rework in construction. Still, it can address many problems that emerge in alliances and enable collective learning. By engaging in conversation and 'speaking up', deliberations can flow (Lane 2018). In this case, people can consciously

and unconsciously weigh up different views—accepting some and disagreeing with others. Learning and innovation can emerge through exploring different views and solutions to problems. However, despite the putative significance of dialogue within and across projects in the alliances, which we show in this paper, it is a poorly understood construct in the management of projects. It lacks an explicit theoretical underpinning (Lane 2018).

With the nature of alliancing and the use of the PAA and incentive regimes, a unique form of dialogue exists as it is characterized by participants' 'mutual positive orientation towards each other and the communication in which they engage' (Lane 2018, 657). The collaborative nature of alliances leads to interactive, respectful, and open dialogue, which moves beyond the superficial and results in 'mutually-beneficial and acceptable' outcomes (Lane 2018, 657). Indeed, dialogue can take many forms and be used in various contexts (Lane 2020). In its most straightforward form, dialogue can be viewed as 'two-way communication with one participant sending information and the other receiving and responding', but there is no reference to context here (Lane 2020, 5).

While this fundamental view of dialogue forms a part of everyday practice, it is ineffectual for decision-making, problem-solving, and learning complex settings, such as alliancing. However, our research suggests that dialogue in alliances is value-laden with 'mutuality, propinquity, empathy, risk and commitment', which aligns with Lane's view of 'true dialogue' (Lane 2020, 6). While having shown 'true dialogue' is needed to address errors and rework, it can be applied to other problem areas, such as dealing with stakeholders, determining a TOC/TAE, and industrial relations.

The institutionalization of dialogue in the program alliances we have examined, beyond simply addressing rework, translates into three propositions:

1. Program alliancing requirements (e.g. PAA and KRAs) require integration and cross-team collaboration, facilitating effective individual-team dialogue.
2. Program alliancing cross-team and cross-project collaboration tools and processes facilitate effective individual-team dialogue.
3. Program alliancing cross-team and cross-project dialogue can generate greater value across a project's lifecycle (i.e. design, delivery, operations, and maintenance).

We suggest that these propositions provide a basis for evaluating the value of dialogue not in program alliances but also in other forms of relational project delivery systems.

5.2. Managerial implications

Dialogue within the context of our paper is a specific form of group interaction whereby collective learning takes place out of collaboration, trust, and mutual respect—determining how the dialogue will be used and for what purpose can present managers with challenges. We also showed how cross-project context-rich knowledge could be systematically shared within a program of work. Engaging in 'true dialogue' can be a time-consuming process, and more often than not, managers, engineers, and the like have to make decisions on the go. In such circumstances, two-way communication is whereby participants send and receive and respond to other participants' messages. The level of engagement and depth of dialogue will depend on the importance of the task, decision-making, problem, and learning needed.

Managers are, in essence, facilitators of dialogue as they have to manage staff and ensure resources are available and the completion of work within a given time horizon. Additionally, the managers within program alliances need to deliver, develop staff capabilities, and shepherd change through continuous improvement. Irrespective of the level of management within an alliance, each has a role to play in upending the defensive routines that may 'maintain hierarchical hegemony' and head off coercive behaviour by creating a dialogic environment where members are comfortable to 'speak up' through emancipatory dialogue (Raelin 2012, 826). Thus, managers and leaders within an alliance must provide a workplace where their teams feel comfortable with interpersonal risk-taking and 'speaking up'. Without such a workplace, dialogue and its ensuing benefits will not be realized.

6. Conclusion

The theoretical and practical dimensions of dialogue as a means for harnessing the profound benefits of collective learning in program alliances have yet to be realized. To fill this void in knowledge, this paper has aimed to address the following research question: *How does the value of dialogue influence effective collaboration in program alliances?* A sense-making lens was adopted to understand how alliance members come to understand and move forward with unexpected or unanticipated information; that is, how they make sense of an ambiguous situation.

Reflecting on two program alliances, the authors have been studying for several years, we retrospectively reflect on the nature of the dialogue that took place while they delivered water and transport infrastructure assets. We examine the nature of dialogue by looking at a problem that negatively impacted the alliance's performance and productivity—*rework*. We draw upon our extensive interview, documentary sources, intimate knowledge of the alliances, and informal discussions with their members to address our research question.

Our paper indicates that dialogue can take various forms. Still, in the context of addressing rework, we observed it to be value-laden, displaying the characteristics of mutuality, propinquity, empathy, risk, and commitment. These characteristics align with alliancing principles and are also inherently embedded within an error management culture. However, if people do not feel safe to 'speak up' and actively engage in effective dialogue, then program alliances will struggle to deliver successful projects as it is needed to create a shared purpose, learning, engendering collaboration,

supporting culture, and ensuring mutually beneficial outcomes.

To our knowledge, the research presented in this paper is the first to examine the nature of dialogue in program alliances. While our insights demonstrate the criticality of dialogue in enabling collaboration, they are confined to the context of rework. Thus, we suggest that future lines of inquiry examine the nuances of dialogue and the interactions between team members in alliance interactions at a micro-level using an ethnographical lens to garner an in-depth understanding of 'how and why dialogue' works in practice.

We have only touched on the cross-project aspect of dialogue in program alliances where the value and validity of participants' past experiences are accepted as part of their residing 'culture'. Thus, further research is required to unearth the systems and other cross-project dialogue enablers that prevail within and between projects within a program of work.

Notes

1. The nine tenets of value proposed by Devland, Lohne, and Klakegg (2018) are: (1) value is the result of an evaluative judgment; (2) values guide value; (3) value is dependent on knowledge; (4) value is particular; (5) value is comparative; (6) value can be decomposed into a set of get-and-give components; (7) value is not summative; (8) value is experienced based; and (9) value is context dependent.
2. A just culture focuses on shared accountability. The organization is accountable for the systems they have designed and for responding to the behaviours of their employees in a fair and just manner.

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Ethical approval

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